Latency.—The effects and after-effects occur very sharply at beginning and end of strong illumination of moderate duration. The latent period is between 3 and 10 sec.

Fatigue and Recovery.—The effects of successive illuminations (of 5 minutes' duration) progressively diminish if repeated at "short" intervals (10 minutes). At intervals of about 1 hour, successive illuminations of 5 minutes produce approximately equal effects.

With the leaf of Mathiola, I have used periods of illumination of 2 minutes at intervals of 15 minutes without provoking any obvious sign of fatigue.

Conclusions.—The leaves of certain plants under favourable conditions of life exhibit electromotive effects and after-effects, amounting to $\pm$ 0·02 volt in response to illumination.

As in the case of animal tissue, it is possible that the negative (zincative) effect may be significant of dissimilation, and the opposite effect or after-effect significant of assimilation.

The absence of distinct response in petals indicates that chloroplasts are essential to the reaction.

The absence of distinct response in the green leaves of trees and shrubs is possibly due to a lower average metabolism in such leaves, as compared with the activity of leaves of small young plants, in which leaf-functions are presumably concentrated within a smaller area.

"On the Viscosity of Gases as affected by Temperature." By LORD RAYLEIGH, F.R.S. Received June 20,—Read June 21, 1900.

A former paper* describes the apparatus by which I examined the influence of temperature upon the viscosity of argon and other gases. I have recently had the opportunity of testing, in the same way, an interesting sample of gas prepared by Professor Dewar, being the residue, uncondensed by *liquid hydrogen*, from a large quantity collected at the Bath springs. As was to be expected,† it consists mainly of helium, as is evidenced by its spectrum when rendered luminous in a vacuum tube. A line, not visible from another helium tube, approximately in the position of D_5 (Neon) is also apparent.‡

The result of the comparison of viscosities at about 100° C. and at

* 'Roy. Soc. Proc.,' vol. 66 (1900), p. 68.

† 'Roy. Soc. Proc.,' vol. 59 (1896), p. 207; vol. 60 (1896), p. 56.

‡ I speak doubtfully, because to my eye the interval from D_1 to D_3 (helium) appeared about equal to that between D_3 and the line in question, whereas, according to the measurements of Ramsay and Travers ('Roy. Soc. Proc.,' vol. 63 (1898), p. 438), the wave-lengths are—

the temperature of the room was to show that the temperature effect was the same as for *hydrogen.*

In the former paper the results were reduced so as to show to what power (n) of the absolute temperature the viscosity was proportional.

	n.	c.
Air	0·754	111·3
Oxygen	0·782	128·2
Hydrogen, Helium	0·681	72·2
Argon	0·815	150·2

Since practically only two points on the temperature curve were examined, the numbers obtained were of course of no avail to determine whether or no any power of the temperature was adequate to represent the complete curve. The question of the dependence of viscosity upon temperature has been studied by Sutherland,* on the basis of a theoretical argument which, if not absolutely rigorous, is still entitled to considerable weight. He deduces from a special form of the kinetic theory as the function of temperature to which the viscosity is proportional

$$\frac{\theta^{\frac{1}{2}}}{1+c/\theta} \qquad \text{(1)},$$

c being some constant proper to the particular gas. The simple law $\theta^{\frac{1}{2}}$, appropriate to "hard spheres," here appears as the limiting form when θ is very great. In this case, the collisions are sensibly uninfluenced by the molecular forces which may act at distances exceeding that of impact. When, on the other hand, the temperature and the molecular velocities are lower, the mutual attraction of molecules which pass near one another increases the number of collisions, much as if the diameter of the spheres was increased. Sutherland finds a

D_1	5895·0
D_2	5889·0
D_3	5875·9
D_5	5849·6,

so that the above-mentioned intervals would be as 19·1 : 26·3. [*June* 23.—Subsequent observations with the aid of a scale showed that the intervals above spoken of were as 20 : 21. According to this the wave-length of the line seen, and supposed to correspond to D_5, would be about 5855 on Rowland's scale, where D_1 = 5896·2, D_2 = 5890·2, D_3 = 5876·0.] I may record that the refractivity of the gas now under discussion is 0·132 relatively to air.

* 'Phil. Mag.,' vol. 36 (1893), p. 507.

very good agreement between his formula (1) and the observations of Holman and others upon various gases.

If the law be assumed, my observations suffice to determine the values of c. They are shown in the table, and they agree well with the numbers for air and oxygen calculated by Sutherland from observations of Obermayer.

Report of Magnetical Observations at Falmouth Observatory for the Year 1897. Latitude 50° 9′ 0″ N., Longitude 5° 4′ 35″ W.; height, 167 feet above mean sea-level.

The Declination and Horizontal Force are deduced from hourly readings of the photographic curves, and so are corrected for the diurnal variation.

The results in the following tables, Nos. I, II, III, IV, are deduced from the magnetograph curves, which have been standardised by observations of deflection and vibration. These were made with the Collimator Magnet, marked 66A, and the Declinometer Magnet, marked 66C, in the Unifilar Magnetometer No. 66 by Elliott Brothers, of London. The temperature correction (which is probably very small) has not been applied.

The Declination and Horizontal Force values given in Tables I to IV are prepared in accordance with the suggestions made in the Fifth Report of the Committee of the British Association on comparing and reducing magnetic observations, and the time given is Greenwich Mean Time, which is 20 minutes 18 seconds earlier than local time.

The following is a list of the days during the year 1897 which were selected by the Astronomer Royal as suitable for the determination of the magnetic diurnal variations, and which have been employed in the preparation of the magnetic tables:—

January ...	6,	9,	22,	23,	26.	July	1,	9,	13,	18,	26.
February ...	2,	9,	17,	18,	20.	August ...	4,	5,	6,	24,	31.
March	14,	15,	16,	18,	20.	September	13,	18,	19,	26,	28.
April	3,	11,	12,	15,	22.	October	5,	9,	13,	20,	21.
May	8,	9,	12,	16,	28.	November	7,	8,	12,	23,	30.
June	8,	9,	10,	12,	30.	December	8,	13,	26,	27,	28.

EDWARD KITTO,
Magnetic Observer.